

WHAT IS CLAIMED IS:

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1. A test method for examining a shooting direction of a camera apparatus, comprising:

obtaining a photographed image by photographing with said camera apparatus a test chart placed at a predefined position ahead of said camera apparatus with a reference pattern drawn on the test chart;

setting a judgment pattern at a specific position on said photographed image;

displaying said photographed image on a display device;

and

comparing a position of said reference pattern and a position of said judgement pattern on said displayed photographed image.

2. The test method for examining the shooting direction of the onboard camera apparatus according to claim 1, wherein said judgment pattern having at least one judgment reference line extending in a horizontal direction and at least one judgment reference line extending in a vertical direction is set on said photographed image in said setting step.

3. The test method for examining the shooting direction of the camera apparatus according to claim 1, wherein said photographed image is displayed on a navigation display

provided in a navigation device in said displaying step.

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5 4. A test method for examining a shooting direction of a camera apparatus attached to a body of a vehicle, comprising:

obtaining a photographed image by photographing with said camera apparatus a test chart placed at a predefined position ahead of the vehicle with a reference pattern drawn on the test chart;

10 determining a position of said reference pattern on said photographed image; and

judging on compliance or non-compliance of the shooting direction of said camera apparatus based on a relationship between the position of said reference pattern determined and a proper range defining a range appropriate for the shooting direction of said camera apparatus.

15 5. The test method for examining the shooting direction of the onboard camera apparatus according to claim 4, wherein said determining step includes:

20 evaluating a correlation of each of specific regions in said photographed image with a previously prepared specific brightness characteristics pattern; and

specifying a position of one of said regions having the greatest correlation as the position of said reference pattern;

25 wherein said brightness characteristics pattern has the

same brightness characteristics as said reference pattern shown on said photographed image.

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5 6. The test method for examining the shooting direction of the onboard camera apparatus according to claim 5, wherein said determining step includes evaluating the correlation with said brightness characteristics pattern by searching through a specific search range within said photographed image,

10 wherein a setting position of said search range is determined based on the position of said reference pattern shown on said photographed image under conditions where said camera apparatus is properly mounted, and an area of said search range is set in consideration of a deviation of the shooting direction of said camera apparatus.

15 7. The test method for examining the shooting direction of the camera apparatus according to claim 1, wherein said reference pattern is at least one of a crisscross pattern and a rectangular pattern.

20 8. The test method for examining the shooting direction of the camera apparatus according to claim 4, comprising:

25 notifying an examiner of information concerning current mounting conditions of said camera apparatus or information concerning adjustment of the mounting of said camera apparatus

according to the amount of deviation of said reference pattern when said reference pattern deviates from said proper range.

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9. The test method for examining the shooting direction of the camera apparatus according to claim 8, wherein said camera apparatus is attached to the vehicle body via a replaceable mounting member and the shooting direction of said camera apparatus is determined by the shape of said mounting member; and

10 said notifying step includes: selecting a mounting member having a shape for minimizing the amount of deviation of said reference pattern from a plurality of previously prepared mounting members having different shapes; and notifying the examiner of said selected mounting member.

10. The test method for examining the shooting direction of the onboard camera apparatus according to claim 1, wherein said camera apparatus is a stereo camera apparatus having a pair of cameras, and said photographed image is an image photographed by one of said cameras.

11. A test device for examining the shooting direction of a camera apparatus installed on a vehicle, comprising:

a camera apparatus attached to a body of the vehicle and outputs a photographed image by photographing a situation ahead

of the vehicle;

processing unit for superimposing a specific judgment pattern on a specific position of said photographed image; and

display device for displaying said photographed image,

wherein said camera apparatus photographs a test chart placed at a predefined position ahead of the vehicle with a specific reference pattern drawn on the test chart during a test;

said processing unit performs the superimposition operation on said photographed image during the test; and

said display device displays the position of said reference pattern on said photographed image and the position of said judgment pattern in a manner that they are compared with each other during the test.

12. The test device for examining the shooting direction of the camera apparatus according to claim 11, wherein said processing unit superimposes said judgment pattern having at least one judgment reference line extending in a horizontal direction and at least one judgment reference line extending in a vertical direction on said photographed image.

13. The test device for examining the shooting direction of the onboard camera apparatus according to claim 11, wherein said display device is a navigation display provided in a

navigation device.

14. A test device for examining the shooting direction
of an onboard camera apparatus attached to a body of a vehicle,
comprising:

a camera apparatus attached to the vehicle body and
outputting a photographed image by photographing a situation
ahead of the vehicle; and

test unit for examining the shooting direction of said
camera apparatus based on a photographed image obtained by
photographing with said camera apparatus a test chart placed
at a predefined position ahead of the vehicle with a specific
reference pattern drawn on the test chart during a test;

wherein said test unit determines the position of said
reference pattern on said photographed image, and wherein said
test unit judges that the shooting direction of said camera
apparatus is proper when the position of said reference pattern
determined falls within a proper range defining a range
appropriate for the shooting direction of said camera apparatus,
and said test unit judges that the shooting direction of said
camera apparatus is improper when the position of said reference
pattern falls outside said proper range.

15. The test device for examining the shooting direction
of the camera apparatus according to claim 14, wherein said test

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unit evaluates a correlation of each of specific regions in said photographed image with a previously prepared specific brightness characteristics pattern and specifies the position of one of said regions having the greatest correlation as the position of said reference pattern; and

said brightness characteristics pattern has the same brightness characteristics as said reference pattern shown on said photographed image.

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10 16. The test device for examining the shooting direction of the camera apparatus according to claim 15, wherein said test unit evaluates the correlation of each of specific regions existing in a specific search range within said photographed image with said brightness characteristics pattern; and

15 the setting position of said search range is determined based on the position of said reference pattern shown on said photographed image under conditions where said camera apparatus is properly mounted, and the area of said search range is set in consideration of a deviation of the shooting direction of

20 said camera apparatus.

25 17. The test device for examining the shooting direction of the camera apparatus according to claim 11, wherein said reference pattern is at least one of a crisscross pattern and a rectangular pattern.

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18. The test device for examining the shooting direction of the camera apparatus according to claim 14, comprising:

a mounting member;

5 wherein said camera apparatus is attached to the vehicle body via said mounting member; and

wherein said test unit outputs instructional information concerning adjustment of the mounting of said camera apparatus according to the amount of a deviation of said reference pattern relative to said proper range when the position of said reference pattern deviates from said proper range.

19. The test device for examining the shooting direction of the camera apparatus according to claim 18, wherein said mounting member is a replaceable member being independent of said camera apparatus wherein the shooting direction of said camera apparatus is determined by the shape of said mounting member; and

20 said test unit selects a mounting member having such a shape for minimizing the amount of deviation of said reference pattern from a plurality of previously prepared mounting members having different shapes, and outputs the instructional information concerning said selected mounting member.

25 20. The test device for examining the shooting direction

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of the camera apparatus according to claim 19, wherein said mounting member is a plate-like member having a tapered shape in cross section along the shooting direction, and the vertical component of the shooting direction of said camera apparatus is determined by said tapered shape.

21. The test device for examining the shooting direction of the camera apparatus according to claim 11, wherein said camera apparatus is a stereo camera apparatus.

22. A structure for mounting an onboard sensor, comprising:

a sensor for monitoring traffic conditions ahead of a vehicle;

a sensor assembly for assembling said sensor; and
a mounting member formed independently of said sensor assembly,

wherein said sensor assembly is attached to a vehicle body via said mounting member, and a monitoring direction of said sensor is determined based on the shape of said mounting member.

23. A structure for mounting an onboard sensor, comprising:

a mounting member;

a sensor assembly attached to a vehicle body via said

mounting member; and

a sensor for monitoring traffic conditions ahead of the vehicle, said sensor being assembled into said sensor assembly,

wherein said mounting member is replaced by removing said sensor assembly, and a monitoring direction of said sensor is determined based on the shape of said mounting member.

24. The structure for mounting the onboard sensor according to claim 22, wherein said mounting member is a plate-like member and the monitoring direction of said sensor is determined by a state of the thickness of said mounting member.

25. The structure for mounting the onboard sensor according to claim 24, wherein said mounting member has a tapered shape in cross section along a longitudinal direction of the vehicle, and the vertical component of the monitoring direction of said sensor is determined by said tapered shape.

26. The structure for mounting the onboard sensor according to claim 22, wherein the monitoring direction of said sensor is adjusted by replacing said mounting member with another mounting member having a different shape.

27. The structure for mounting the onboard sensor

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according to claim 22, wherein a contact surface between said mounting member and said sensor assembly disagrees the horizontal plane under conditions where said sensor is attached to the vehicle body.

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28. The structure for mounting the onboard sensor according to claim 22, wherein comprising:

a fixing member for fixing said sensor assembly to the vehicle body;

10 wherein said mounting member is independent of said sensor assembly when said fixing member is removed under conditions where said sensor assembly is fixed to the vehicle body.

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29. The structure for mounting the onboard sensor according to claim 22, wherein said mounting member is replaced with another mounting member having a slightly different shape; and

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each mounting member is marked with an identification mark indicating features of shape of said mounting member.

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30. The structure for mounting the onboard sensor according to claim 29, wherein a location of said identification mark is placed is an externally unascertainable location under conditions where said sensor is attached to the vehicle body.

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31. The structure for mounting the onboard sensor according to claim 22, wherein said sensor assembly is a stereo camera assembly.

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